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A SURFACE-TO-BEDROCK, SHEAR WAVE AND GEOTECHNICAL INVESTIGATION OF THE POST-PALEOZOIC SEDIMENT ACROSS THE UPPER MISSISSIPPI EMBAYMENT BETWEEN THE 35th AND 36th PARALLELS: COLLABORATIVE RESEARCH WITH THE UNIVERSITY OF MEMPHIS

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Element II (Memphis Metropolitan Area)
Site Effects

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Investigations Undertaken

During the first phase of the this 2-year study we have collected detailed P- and SH-wave seismic reflection and refraction, and short-period (0.2 to 13 Hz) ambient noise data at the thirty sites indicated in Figure 1. Seismic reflection and refraction data are being acquired at a sampling interval of 0.25 ms, while the three-component ambient noise data are being acquired at a sampling interval of 4 ms. For the sites where the depth to the Paleozoic bedrock is less than 200 m, the energy source is a seismic hammer for both the P- and SH-wave soundings. For the sites where the depth to the Paleozoic bedrock is greater than 200 m, the energy source for the P-wave soundings is a EG&G vacuum-assisted weight drop, and a IVI MiniVib for the SH-wave soundings.

Seismic data at the sites are being recorded on a Geometrics StrataVisor, with the P- and SH-wave data being acquired using Mark Products 40 and 30 Hz exploration geophones, respectively. The data for the ambient noise site studies are being acquired with a 1 Hz Mark Products L-4-3D and an active highcut filter of 13 Hz. The P- and SH-wave data for the sites will be made available at the conclusion of the study on a CD in SEG-Y format. The data for the ambient noise studies will also be available at that time on a CD, but they will be in ASCII format.

Results

Results from the P- and SH-wave soundings are being integrated with and correlated to, published P-seismic reflection lines, available drill hole data, and the near-surface SH-wave site studies (Street *et al*., 2001). Results from the three-component ambient noise studies are very encouraging and show a strong correlation with the near-surface SH-wave studies; that is, the near-surface SH-wave velocities and geometries are clearly reflected in the ratio of the horizontal-to-vertical ambient noise based on Nakamura's (1989) technique. Preliminary results of this phase of the study have been submitted for an expanded abstract and eventual paper for publication in Journal of *Soil Dynamics* (Street and Woolery, 2001).

Non-Technical Summary

The objective of this study was to define the properties and two-dimensional configuration of the more than 950 m of soils that overlie bedrock in the central Mississippi Valley. A series of seismic soundings/measurements along a 250 km corridor across the valley were preformed to identify these conditions. The parameters have a profound influence on ground shaking characteristics during an earthquake. Consequently, meaningful seismic hazard reduction must incorporate the affects of these deep soil conditions.

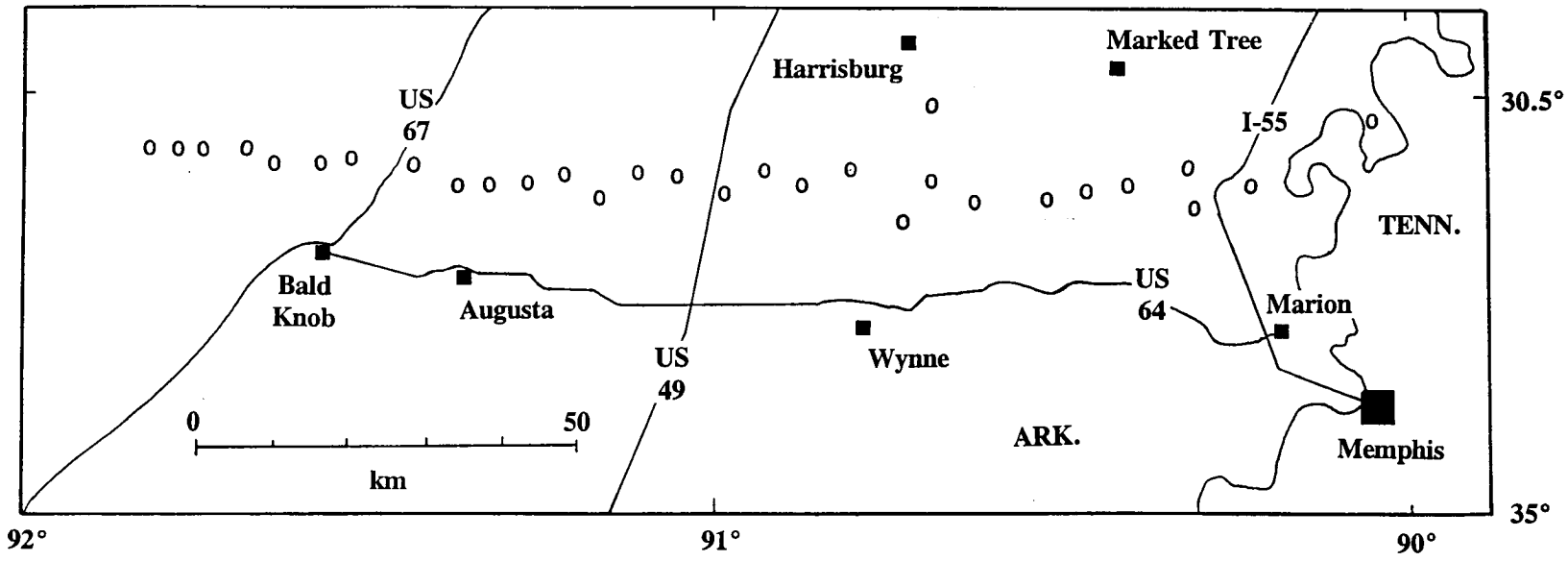

Figure 1. Open circles indicate locations investigated to date as part of this study.

References Cited

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